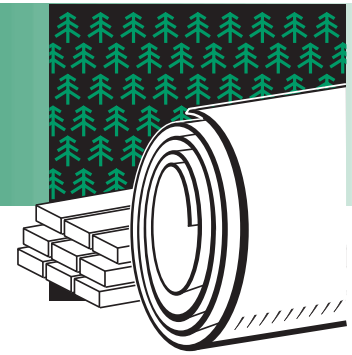# FOREST PRODUCTS

Project Fact Sheet

4-D CHARACTERIZATION OF PAPER WEB AT THE WET END

BENEFITS

- Improved productivity
- Enhanced product quality
- Reduced waste
- Using the expertise of two national laboratories

APPLICATIONS

The technology will be transferred to the paper industry for on-line measurements at the wet end, and subsequent predictions of the paper web parameters.

METHODS WILL BE DEVELOPED TO CHARACTERIZE THE WEB BETWEEN THE HEADBOX AND THE DRYLINE

The paper industry is developing technologies that will allow measurements of 100 percent of the web. This capability will help the industry become more productive, improve its product quality, and reduce processing wastes. Investigators are focusing on the region between the headbox and the dryline, the so-called "wet end" of the paper web, and on developing "intelligent" sensors to capture and analyze images and thereby automatically measure the web's parameters.

There are a number of tasks and sub-tasks to this project that should result in the industry being able to automatically measure the wet end and predict such web parameters as the sheet formation index and impending web breaks. This will ensure that paper processing can be adjusted early to increase the production yield and product quality. Although using the wet end for these measurements is "uncharted territory," two national laboratories and several industry partners will combine their expertise to ensure the success of the project.

WET END MEASUREMENT SYSTEM
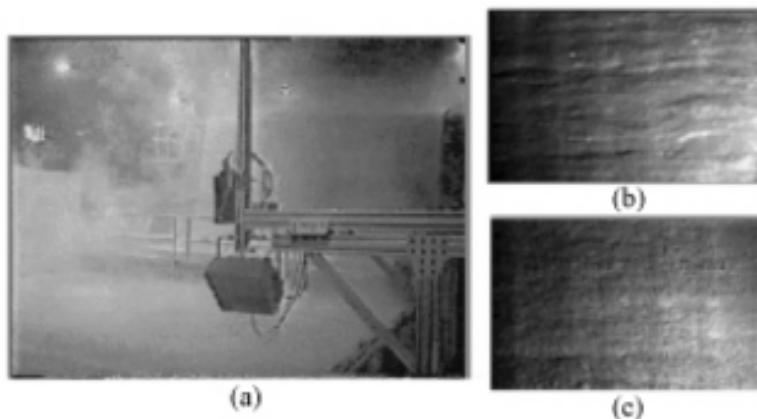
(a) **D**eployed stroboscopic system in Union Camp's Savannah Mill.
(b), (c) High resolution images of the slurry depicting web structures.

Project Description

Goal: To design, develop, and implement a visual system for characterizing the paper web at the wet end.
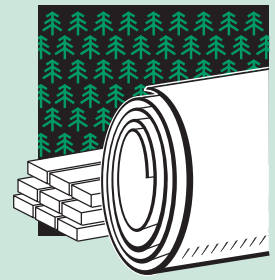
A vision system that uses a CCD area sensor and a strobe light to capture static images of the web will be integrated with a system of image-processing algorithms that can recognize the 3-D characteristics of the web structure. It will be necessary to capture 4-D measurements of the slurry, including x and y coordinates (machine-direction and cross-direction, respectively); the intensity profile, $I(x,y)$; and the depth profile, $z(x,y)$. These real-time measurements will then be used to design image-processing algorithms to quantify the 4-D characteristics of the web structures. After testing and fine-tuning these algorithms in the field, they will be integrated into a computer-based, real-time hardware platform.

Progress & Milestones

- Design, develop, and deploy a CCD-based area sensor and a strobe light to characterize $I(x,y)$ of the slurry in real time.

- Design, develop, and deploy a system for capturing $z(x,y)$, the depth profile of the slurry in real time.

- Integrate the overall system.

- Identify a site for extensive testing; final field testing will occur in Fiscal Year 1999.

Awards, Patents, and Invention Records

An invention disclosure was submitted in February of 1998.